



Aalto University
School of Business

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USER ENGAGEMENT IN FINNISH MOBILE HEALTH APPLICATIONS

Use of Gamification and Social Elements

Erika Natunen

International Business
Bachelor's Thesis
Supervisor: Suzanne Altobello
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Objectives

The main objectives of this study were to analyze how gamification and social elements are used to engage the users of Finnish mobile health applications, as well as the possible connection between these two aspects. Additionally, the relationship between theory and practice is explored through the most relevant consumer psychology frameworks and models. Concerning user engagement, the study focuses particularly on motivation creation.

Summary

In the rapidly growing field of mobile health, successful consumer engagement is critical. In this thesis, diverse means for motivation creation are covered to answer the above-mentioned objectives. Four Finnish health applications were chosen for the analysis according to their diverse purposes and features. Qualitative interviews were conducted for four implementers and three active users of these applications. Both viewpoints were explored to understand the big picture; tools used to build motivation and outcomes in the mind of the consumer.

Conclusion

The research indicates that there is an intertwined connection between gamification, social elements, and user engagement. The results propose that social elements are required to make game elements fully motivational. Means and tools used for motivation creation vary according to the nature and purpose of the application. Experience-driven applications create motivation through social and game elements, whereas more data-driven ones use more functional tools to motivate. Theories considered in health application development mainly consist of social-centered models.

Key words: *mobile health, gamification, motivation, consumer engagement, user engagement, social elements, game elements*

Language: English

Grade:

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1. INTRODUCTION

1.1. Background

Increasing number of people around the world are using mobile devices and smartphones today, and the universal trend is to be connected around the clock. Many players in the healthcare sector have started to exploit this phenomenon by implementing mobile health applications. The utilization of mobile phones can accelerate, widen, and ease the transfer, collection, and analysis of individual data regarding consumer health (Müller et al., 2016).

In this mobile era, people are also exposed to thousands of digital marketing messages all the time. As consumers are already busy and continuously being distracted, they need to be deeply intrigued to be engaged. Consequently, also motivation for improving one's health is difficult to evoke from scratch by willpower. The challenge for organizations to overcome is to find new ways of creating stronger consumer satisfaction and engagement. To success, versatile tools need to be utilized.

Gamification has been introduced as a possible solution to overcome this challenge. The addictive and motivative feature of gamification is that its methods are not based on punishment, but on reward and gratification. Organizations that offer mobile health services have been starting to implement gamification and social elements into their applications. The goal is to encourage independent health promotion, and further to increase engagement to the application. However, these organizations should also understand consumer psychology to be able to successfully engage consumers with game elements.

Mobile health and gamification have been around for years already and extensive research has been done in both fields. However, there are gaps in understanding the extent to which gamification and social elements should be utilized to create strong user motivation and engagement. This research attempts to address this gap by exploring consumer psychology principles and the use of these elements in four Finnish mobile health applications.

1.2. Research Questions

This thesis searches for an answer to the following research questions:

1. How Finnish organizations are using gamification and social elements in their mobile health applications?
2. Which consumer psychology theories have organizations considered when developing these applications?
3. How do the means for user engagement and motivation creation differ between the applications?

1.3. Research Objectives

The research objectives for this thesis are the following:

1. To explore the ways Finnish organizations are applying gamification and social elements in their mobile health applications.
2. To explore how organizations have considered consumer psychology principles when designing these applications.
3. To explore the means and tools used for motivation creation in the applications.

2. LITERATURE REVIEW

2.1. Introduction

The purpose of this section is to shed light on the use of gamification and social elements in the creation and maintenance of consumer engagement. This literature review consists of clarifications and analyses of the most relevant concepts and propositions surrounding the issue on hand. Furthermore, this review will introduce several consumer psychology theories that have previously been examined in studies of a similar context and have proven to be particularly applicable to the present study.

The relationship between user engagement and game and social elements is enlightened by an overview of relevant features from consumer psychology; motivation, experience, and involvement, as well as psychological needs such as self-determination, goal-setting, competence, and social relatedness. This paper also explores specific types of game elements implemented in applications that are designed to enhance physical health of their users. To perceive the intention of this paper, one needs to understand the concepts of mobile health application, gamification, social elements, motivation, and consumer engagement.

2.2. Health Applications and Gamification

More and more mobile health and exercise applications have made an appearance in the recent years (Maturo & Setiffi, 2016; Hamari & Koivisto, 2015). Maturo and Setiffi (2016) argue that a notably large share of those existing health apps contains forms of gamification.

The first appearance of the term 'gamification' was already around the year 2010 (Johnson et al., 2016) and academic research on the field has accumulated aggressively ever since. The concept of gamification refers to a process of implementing and applying game elements to online services with a non-game context (Hamari & Koivisto, 2015; Deterding, 2017; Penkkimäki et al., 2015; Kwon et al., 2015),

and “representing non-game activities in a game-like form” (Maturro & Setiffi, 2015, p. 481).

The presence of game elements is considered evoking experiences (Koivisto et al., 2014) and promoting intrinsic motivations toward activities (Hamari & Koivisto, 2015). Furthermore, these motivations are argued to result in greater user engagement (Shivnetra, 2017; Kwon et al., 2015; Penkkimäki et al., 2015), enhanced customer loyalty (Saidon et al., 2016), “improved effectiveness and efficiency of learning” (Deterding et al., 2011) and even concrete behavioral changes (Maturro & Setiffi, 2015; Mitchell et al., 2017; Washburn, 2017).

Washburn (2017) makes the current significance of gamification clear by stating that as many as 70% of Forbes Global 2000 businesses have already applied or have considered to apply gamification in their operations. Johnson et al. (2016) conducted a study addressing the application of gamification in different fields and found that gamification is most successful in a context of physical health, and especially in applications in which individuals are motivated to increase their physical activity.

Chen & Pu (2014), cited in Hamari & Koivisto (2015) have also proven a positive correlation between gamification and health. Two of their most relevant findings in respect of this study are increased physical activity and “willingness to continue using the health-related system” (Hamari & Koivisto, 2015, p. 334), when gamification was implemented.

Hamari and Koivisto (2015) have emphasized the impact of a cognitive bias that people intrinsically have, called ‘hyperbolic discounting’. According to this bias, people have a tendency to prefer short-term rewards (Hamari & Koivisto, 2015). In other words, people need gratification immediately and are unwilling to wait for long-term rewards. This tendency makes it difficult for people to follow their health aspirations, and for example, causes them to skip physical activities that they know would be beneficial for them (Hamari & Koivisto, 2015).

Many of today's exercise applications aim to motivate users by reconstructing long-term goals into shorter-term goals. This is primarily done by offering users social support (e.g. instant feedback) or rewards (Hamari & Koivisto, 2015).

2.3. Consumer Engagement

Customer engagement has been defined as an interactive relationship resulting from several dynamic experiences between an 'engagement object', and an 'engagement subject'. (Brodie et al., 2011; Bowden et al., 2015; Hollebeek & Chen, 2014). The engagement object can be seen as the service provider and the engagement subject as the consumer (Hollebeek & Chen, 2014). In other words, the formation of customer engagement relies heavily on the creation and maintenance of the relationship between the service provider and the service user (Bowden et al., 2015).

2.3.1. Disengagement

Bowden et al. (2015) have proposed that service relationships can be categorized into two groups according to their characteristics; 'functional and utilitarian' (F/U) and 'proactive and co-creative' (P/C). According to their study, these characteristics also have influence on the depth of engagement. It was found that F/U-natured service relationships were more likely to create weaker customer engagement, and P/C relationships enabled deeper and stronger customer engagement (Bowden et al., 2015). Additionally, in P/C relationships, customers did not want to leave the service, in spite of problems or service failures, but conversely in F/U relationships, customers were more easily disengaged (Bowden et al., 2015). However, Dubbels (2017) points out that even though game elements and techniques often increase short-term engagement, in the long term they may generate feelings of skepticism, which in turn may result in weakened engagement.

Customer experience plays a key role in the formulation of relationship and engagement, and it has been defined as a four-phase process of "interaction that begins with a customer's first attraction, and evolves into awareness, cultivation,

purchase, and advocacy” (Dubbels, 2017, p. 18). Dubbels (2017) also points out that interactive activities increase customer involvement in the experience when compared to passive ones.

2.3.2. Engagement and Performance

Customer engagement is considered as a key to successful marketing and even overall business performance according to several sources of academic literature. Mollen and Wilson (2010) have reported that as much as 90% of companies in the EConsultancy consumer engagement survey, conducted in 2008, disclosed that “online consumer engagement is either ‘essential’ or ‘important’ to their organisations”. Furthermore, Brodie et al. (2011) proposes that appropriate effective consumer engagement might act as one of the main components in generating strong performance, competitive advantage, and profitability for many businesses, especially those functioning in dynamic environments.

2.4. Motivation

2.4.1. Extrinsic and Intrinsic Motivation

According to a study conducted by Maturo and Setiffi (2015) about weight-loss centered health apps, users act according to two separate bases; quantification and gamification. Quantification provides the rational part of dieting, e.g. data analysis and self-tracking. Gamification, on the other hand, provides the emotional part, e.g. maintenance of motivation (Maturo & Setiffi, 2015).

User engagement is, in most cases, created by increasing users’ motivation (Darejeh & Salim, 2016). Motivation can be divided into two general types: Intrinsic and extrinsic motivation. Extrinsic motivation is also called instrumental behavior (Ünlü & Dettweiler, 2015) and it is driven by an outside reward or demand, where individual is focused on reaching a specific, external outcome (Malik et al., 2015).

According to Ünlü and Dettweiler (2015), extrinsic motivation has four types of regulation to stand for different forms of instrumentality; integration, identification, introjection, and external regulation. Integration is the most internalized form of extrinsic motivation, in which case the person is more autonomous (Ünlü & Dettweiler, 2015).

Ryan and Deci (2000) have defined intrinsic motivation as a type that is based on an internal drive; one does something simply because of an interest towards the activity and strives to achieve a personal goal of satisfaction and enjoyment. Both consumer experience and perceived performance are highly dependent on whether the consumer is behaving for intrinsic or extrinsic reasons (Ryan & Deci, 2000).

When a company has a deep understanding of the motivation behind consumers' decisions and actions, game components and stimuli of the right kind can be implemented successfully (Gatautis et al., 2016). Werbach and Hunter (2012) have even stated that understanding the difference between extrinsic and intrinsic motivation is inevitable to be able to use the right types of elements to motivate users.

2.4.2. Extrinsic and Intrinsic Rewards

Extrinsic motivation can be induced by extrinsic rewards. According to Malik et al. (2015), these rewards can be either monetary (e.g. bonuses and discounts) or non-monetary. Examples of non-monetary rewards are recognition, future career opportunities, reward systems, and competence (Malik et al., 2015; Ünlü & Dettweiler, 2015). Non-monetary rewards are also called social rewards.

Intrinsic motivation does not need an external source of control, as it comes from within. These sources of motivation can be "psychological needs for autonomy and competence" (Deci et al., 1999), or personal interests, values, and pure curiosity (Ünlü & Dettweiler, 2015). However, Deci et al. (1999) also acknowledges that internal motivation can partly derive from an external source, but even then, the primary motivator needs to be internal.

There are various mechanisms by which extrinsic rewards are used. According to Deci et al. (1999), these rewards have two aspects; controlling and information. Malik et al. (2015) specifies that the most essential mechanisms are expectancy, reinforcement, and self-determination.

General interest theory (Eisenberger, Pierce, & Cameron, 1999) indicates that rewards foster a sense of personal control over the environment, satisfying underlying human needs for autonomy. Satisfaction of these needs leads individuals to be intrinsically motivated and productive (Parker et al., 2017). In addition, Parker et al. (2017) argues that intrinsic rewards undeniably work more effectively in the long run, but extrinsic rewards are needed “on the road to change”.

Schlesinger et al. (2008) have identified three types of models for measuring “interestingness” that reflects intrinsic motivation: knowledge-based models, competence-based models, and morphological models. According to them, knowledge-based models and competence-based models are associated with the creation of adaptive motivation. The strength of this type of motivation depends on the situation where it is confronted. The same activity creates different amounts of interest in different moments. Competence-based models examine self-generated goals and create adaptive motivation through increasing levels of performance and competence. Finally, morphological models measure immediate levels of interestingness that require no previous competence, and lead to fixed motivation. These models can be used in creation of gamified services to ensure the generation of users’ intrinsic motivation.

2.5. Conceptual frameworks

There are several conceptual frameworks and models applicable in mobile health environment, regarding consumer engagement. The following frameworks cover a wide area of consumer psychology, mainly over motivation, goal-setting, reinforcement, and social theories. These frameworks lay a foundation for the

research; gamified and social aspects that enhance consumer engagement, motivation, and performance.

2.5.1. Self-Determination Theory

Ryan & Deci (2000) have introduced self-determination theory. It is a human motivation framework and makes distinction between intrinsic and extrinsic motivation. Ünlü and Dettweiler (2015) conclude that the core of this theory is the relationship between the intrinsic needs that reside in the nature of human beings, and the extrinsic forces on how one acts according to other people. As mentioned above in the section regarding extrinsic and intrinsic motivation, the three identified psychological needs (self-determination, competence, and relatedness) form the core of the self-determination theory (Ryan & Deci, 2000; Ünlü & Dettweiler, 2015).

2.5.2. Goal-Setting Theory

According to goal setting theory, constantly received rewards allow individuals to set and accept specific goals for themselves (Erez, 1977; Parker et al., 2017). Moreover, both motivation and performance of these individuals will increase due to the acceptance of goals (Parker et al., 2017). Erez (1977) has pointed out that in a study conducted by Locke (1967), the importance of feedback was examined with respect to goal setting. It was found that if no knowledge of progress and personal performance is given to, meaningful goals cannot be set (Erez, 1977).

2.5.3. GROW-Model

GROW-model, originally developed by John Whitmore in 1996. It has been described as 'a coaching model'. The abbreviation comes from the words 'Goal, Reality, Opportunities and What next' (Dembkowski & Eldridge, 2003). The letter 'W' can alternately be referred to 'Will' or 'What next' depending on the source and context (Palmer, 2008). The GROW-model partially fits goal-setting theory, as it emphasizes the exploration of goals of the people being mentored (Dembkowski & Eldridge, 2003).

This model is applicable to implementation in mobile health applications, especially in case the app offers coaching or other personalized health service.

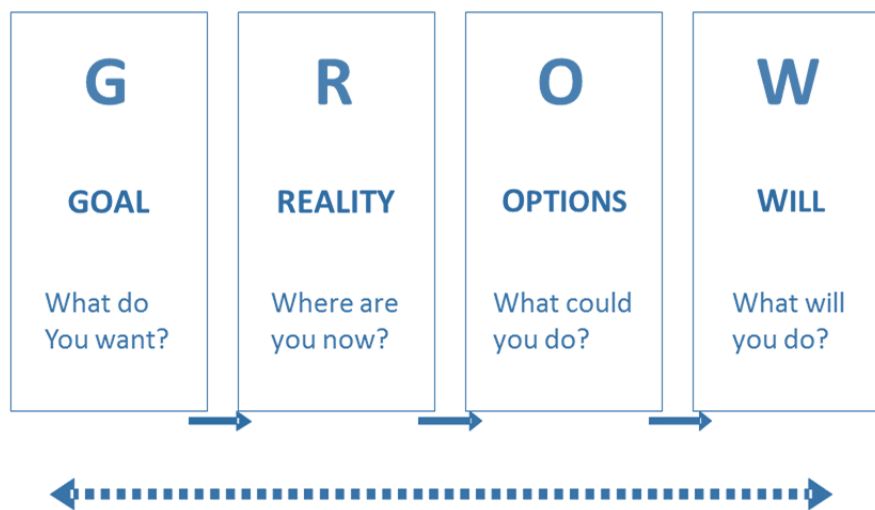


Figure 2. GROW-Model. (Coaching for Performance, 2004.)

2.5.4. SOR Model

Mollen and Wilson (2010) have analyzed the role and nature of consumer engagement using Stimulus-Organism-Response (SOR) model, which was initially proposed by Eroglu et al. (2003). According to the framework, online consumer experience is composed of three elements; the operator environment as the stimulus, the consumer's experiential response, and the following attitudes and behaviors of the consumer. The experiential response is suggested to include interactivity and telepresence, as well as engagement (Mollen & Wilson, 2010).

Furthermore, effective engagement has three requirements; cognitive processing, instrumental value (e.g. relevance or usefulness), and experiential value (e.g. coherence of emotions) (Mollen & Wilson, 2010). Gatautis et al. (2016) points out that SOR model is mainly a tool for examining online consumer behavior. Companies try to cause a positive impact on the consumers by applying different stimuli. Furthermore, that positive impact makes the consumers more willing to use that specific service (Gatautis et al. 2016).

2.5.5. Reinforcement Theory

Reinforcement theory is one of the oldest theories regarding motivation and it was derived by the psychologist B.F. Skinner (1969). The theory is based on the relationship between individual's behavior and its consequences. More precisely, it suggests that when behavior leads to positive consequences, the individual is more likely to repeat it, and when the behavior leads to a negative outcome, it is not so likely repeated (Maleka, 2014).

Reinforcement theory proves to be applicable in this study, as rewards are an example of positive reinforcement. Parker et al. (2017) states that when receiving rewards, the performance, motivation, and productivity of the individual increase, and one reaches behavioral targets more often.

2.5.6. Cognitive Evaluation Theory

Cognitive evaluation theory (Deci et al., 1999) proclaims that intrinsic motivation is derived from psychological needs, especially needs for self-determination and competence. According to the theory, rewards can either allow or impede the satisfaction of these needs. When need satisfaction is enabled, intrinsic motivation increases, and conversely when need satisfaction is impeded, intrinsic motivation decreases. Consumers mainly perceive rewards either as “controllers of their behavior or indicators of their competence” (Deci et al., 1999).

2.5.7. Social Object Theory

Social object theory, originally introduced by Jyri Engeström in 2007, is a structural framework for social networks and services. The core of social object theory is that all online social interaction is centered on an object. According to McDonald (2009), this theory can be applied to versatile contexts and offers an explanation to the question of why people with no direct relationship are able to have a connection in a social interface. When implementing this theory into an online social platform, the object

needs to be early identified, built, and optimized to successfully meet the needs of the users. The object may even be the core of the whole idea (McDonald, 2009).

2.6. Game Elements

There are different types of activities that are considered belonging to the family of “games”. For example, this broad family includes board games, dice games, card games, and games that take place in a virtual reality, e.g. video and computer games. There are also physical games, such as ball games and sport games. All types of games have distinctive characteristics that separate them from others. However, Laas (2016) remarks that all games must have some characteristics in common to be categorized as “games”. Suits (1978) cited by Laas (2016) identifies the key features of any game-play; attempting to achieve a specific outcome, acting according to a set of rules, and most precisely, willingly conquering forthcoming obstacles on the way to reach the goal. In addition, games usually require either physical or mental effort (Laas, 2016).

Even though there is a diverse assortment of gamified services and hence various types of gamified systems, they commonly obtain similar characteristics. These characteristics can be motivational; such as instant feedback for a single achievement, or constant feedback for progress towards reaching a goal (Johnson et al., 2016). Motivational features can also be in the form of interface elements such as digital badges, levels, point scores, certificates, competitions, scoring systems, and rankings (Johnson et al., 2016; Mitchell et al., 2017; Maturo & Setiffi, 2015; Dubbels, 2016).

Werbach and Hunter (2012) proposed a hierarchy for game elements in a shape of a pyramid. According to the model, there are three layers of elements: game dynamics, game mechanics, and game components. Game dynamics are technically broad view concepts that need to be managed but cannot be concretely planted, e.g. emotions and relationships. Game mechanics are processes that develop user engagement through actions, such as solving problems, collecting and competing. Game components are concrete means placed in the system, e.g. badges and points.

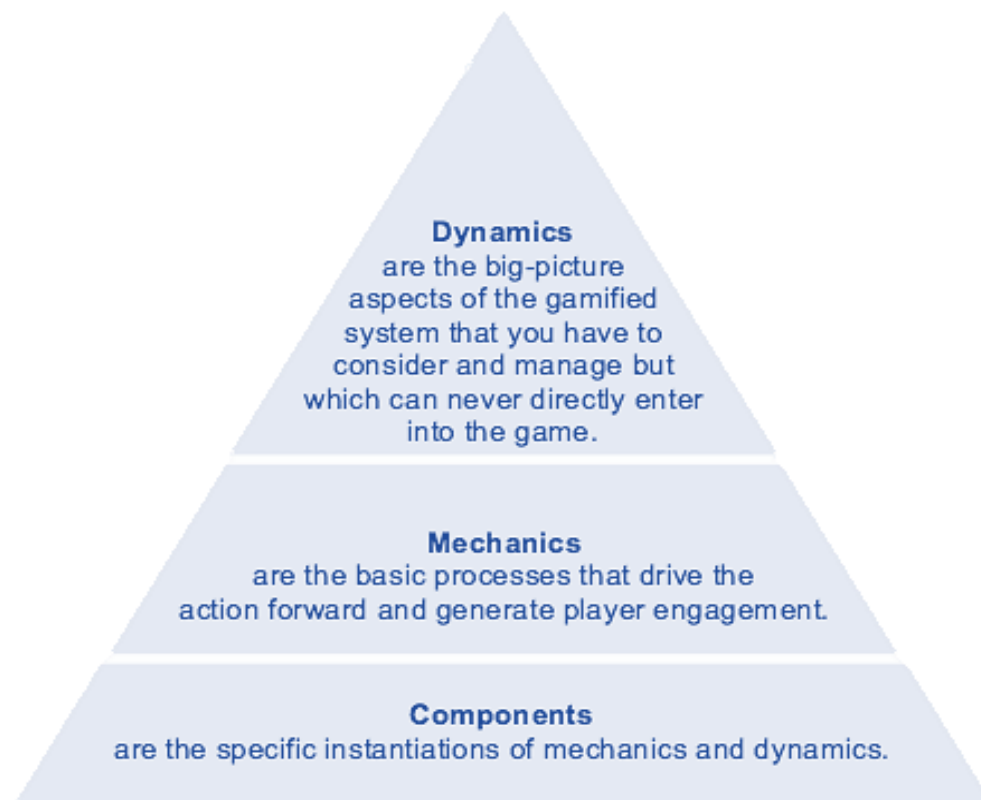


Figure 2. Pyramid of Game Elements (Werbach & Hunter, 2012).

2.6.1. Game Components

Game components are targeted directly and personally to users and their purpose is to increase user involvement and motivation. The components also ensure that the game-like experiences are perceived fun and exciting (Werbach & Hunter, 2012).

Gatautis et al. (2016) has further explored online game components and divided them into three main types; website components, process related game components, and social related game components. Badges, avatars, leaderboards, and other elements that are easily identified and directly visible to consumers are examples of website components. As for process related components, they principally give information about the user's progress, by indicating levels, or unlocking new areas. Social components contain interaction or representation of social status, for example cooperation, teamwork, or giving gifts to other users (Gatautis et al., 2016).

The use of digital badges in online context stem from a deep-rooted tradition in the real world. Over centuries, badges have been used as incentives by many facets (Kwon et al., 2015), e.g. merit badges used in scouts and armies. In many applications using badges as markers of achievement, users can decide whether they want to keep the badge hidden or display the badge to other users by posting it either to their own profile, or to third-party platforms, e.g. Facebook or Twitter (Kwon et al., 2015).

2.6.2. Successful Implementation of Game Elements

Washburn (2017) has suggested a list of six requirements for a successful implementation of game elements to maximize engagement. These requirements are; (1) careful planning before launching, (2) identifying the most critical areas to improve, (3) changing and developing rewards and incentives, (4) keeping the initiative and rationale clear and professional, (5) emphasizing recognitions of accomplishment, and (6) matching the right types of motivators with the right people (Washburn, 2017). A similar set of steps for game design has previously been proposed by Werbach and Hunter (2012); First, defining (1) business objectives and (2) target behaviors, then (3) describing users, (4) creating activities, (5) coming up with ways to make the activities fun, and finally, (6) setting up the applicable tools.

2.7. Social Elements

Social web environment has required gamification to broaden its focus from an individual user to online communities. Gamification is more and more widely connected to social elements. Hence, developers also need to find ways to enhance community dynamics using game mechanics (Kwon et al., 2015). According to Zichermann and Cunningham (2011), a big issue for gamification developers and designers is to realize the social characteristic of an average user. Game designs often focus on creating experiences of achievement and winning, when they should be more focused on experiences of socializing, as that is a stronger driver for a major part of the audience (Zichermann & Cunningham, 2011).

Hamari & Koivisto (2015) suggest that social influence has an important role in how effectively gamification works in an application. 'Fun' activities are considered having significant importance in the creation of motivation and the overall functionality of gamification (Johnson et al., 2016). These fun activities include experiences with other users, such as sharing goals, cooperating (Johnson et al., 2016), giving feedback or even commenting (Penkkimäki et al., 2015). Chen and Pu (2014) cited in Johnson et al. (2016) have found that the elements and features of gamification are often more motivating than exercising alone.

Alongside with the needs for 'autonomy' and 'competence' mentioned above, Deci and Ryan (2000) propose that a person's intrinsic motivation toward certain activity may increase when a psychological need for 'relatedness' is fulfilled. Zhang (2008), cited by Hamari & Koivisto (2015), has applied this finding in an online context, and proposes that if the user perceives a feeling of relatedness while using a system, one is also more likely to have a deeper engagement to it, and to be more willing to use it. Even if the users would be exercising alone, they are sharing the exercise with other people through the application. Hence, their own work is seen and acknowledged by others. This creates an experience of relatedness as well as a feeling of being "separately together" (Penkkimäki et al., 2015). This supports the proposal that social support is an effective tool for creating strong user engagement.

Faraj and Johnson (2011) have argued that there are three main reasons for why users feel motivated to participate in an online community; building reputation, assessing features from other participants, and attaching to people with similar interests. There is a social aspect in the digital badge earning as well, as the badges can be published and made visible to other users in the community (Kwon et al., 2015).

Penkkimäki et al., (2015) showed that the community has an influence on individual consumer's amount of exercise and app usage, mainly in the form of social support and social pressure. According to their study, social support can be e.g. feedback on achievements or comments on shared badges. Social pressure, on the other hand, derives from the users' desire to show a certain image of themselves to the community, or to give an indication of their membership. Also, a humane sense of pride drives

users to exercise harder when they have a community watching them (Penkkimäki et al., 2015).

In addition to implementing communities and groups within an application, another type of social element is coaching. This element is present in the above introduced GROW-model. Coaching includes various social features and personalization, such as discussions and one-to-one mentoring, while exploring the goals of the users (Dembkowski & Eldridge, 2003).

2.8. Summary Model

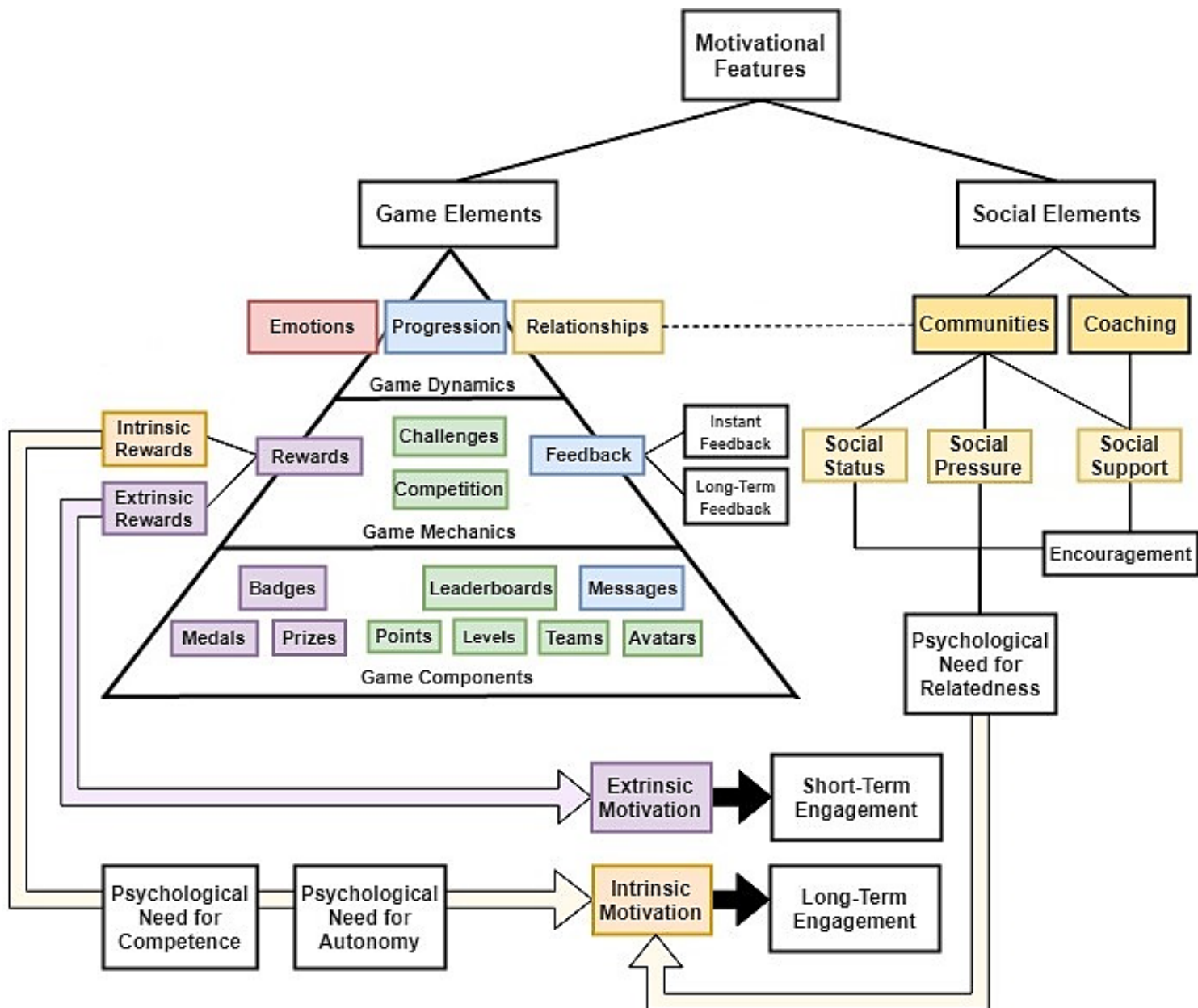


Figure 3. Summary Model: From Social and Game Elements to Engagement

3. METHODOLOGY

3.1. Data Collection

This section will focus on data collection methods in this research. The technique that was chosen will be analysed in more depth, but also potential data collection approaches that were considered will be explored briefly.

Taken the topic of gamification in mobile health applications, this study had two feasible options for a perspective; it could have focused on either the consumers' viewpoint, or application implementers' viewpoint. If the perspective of consumers was chosen, a quantitative method would have been the most appropriate. However, the implementers' side was chosen as significantly less studied. Thus, a qualitative research approach was seen more suitable. Also, as the subject is exploratory by nature, a qualitative approach enables a more insightful and in-depth look into it.

As noted above, this study will focus on the implementers' side more deeply, but the viewpoint of the users is also involved. Users' thoughts on the overall features, game elements, and social aspects of the applications are fundamental, as user motivation and engagement are at the core of this study.

3.2. Semi-structured Interviews

The data was primarily collected by in-depth, semi-structured interviews. Interviews, by definition, are normally one-on-one, interactive discussions that have an objective of collecting information on a specific matter (Harrell & Bradley, 2009). The data collection by structured interviews was also considered, but as a semi-structured one leaves an opportunity to develop the questions according to the answers of the interviewee (Harrell & Bradley, 2009), it was seen more suitable for this research.

Four Finnish mobile health applications were chosen for analysis in this research. They are kept anonymous and referred to as Applications A, B, C, and D. These applications

were specifically selected based on their distinct functions; they all offer a comparably similar service, but each of them has a slightly different focus. The applications will be introduced in more depth in the following sections. In addition to these four main applications of this research, a fifth application will be touched lightly in the section of 'Findings'. Even though not part of the data collection, Application X should be mentioned as its features came up in two interviews concerning various themes.

A total of seven interviews were conducted. Four of the interviewees were application implementers; each one representing one of the health applications in question. The remaining three interviewees were users of these applications. Each interviewed user is an individual, active user of one of the applications. To specify, they are not employees of the companies behind the applications. The user interviewees will also remain anonymous and are referred to as User A (user of Application A), User B (user of Application B), and User C (user of Application C). To ensure a comparable user basis, the interviewed users are all Finns and employees of the same international IT-company. This way the focus is kept on the analysis of the applications.

Application D was launched in the spring 2018, while this research was conducted, thus a user interview regarding that application was not held. A user with substantial experience and judgement on that specific application was considered unattainable and hence inconclusive for this research.

Most of the interviewee contacts were found through the companies' own websites and all interviewees were contacted via email. In a few cases, the emails were directed to the right person by another person in the company, to make sure the interviewees were as knowledgeable of the application as possible. None of the contacted people refused to attend the interview.

3.3. Implementation of Interviews

Six of the interviews were conducted via Skype voice calls and recorded either by a recording software or mobile phone, depending on the circumstances. One was a

telephone interview with no recording. The interview questions were planned beforehand. The same question list was used for all user interviews and another question list for the implementer interviews. However, the questions were slightly modified each time due to differences between the applications. Some questions were left out according to the broadness of the interviewees' answers; e.g. if the interviewee covered the second question already while answering the first question, the second question was not asked.

All the interviews were conducted in Finnish. This was to reduce the potential language barrier, get to a deeper discussion, and thereby receive more extensive material. The interviews were also transcribed in Finnish, and then all put into the same Excel spreadsheet to ensure structural clarity and to ease the analysis. Only the most relevant and applicable parts of the transcriptions were finally translated into English. Direct quotes from interviewees were translated as precisely as possible, from word to word.

The interviews were held within two weeks. The first two took place on February 23, 2018. The first of the two was a user of Application C and the duration of the interview was 21 minutes. The second interviewee was an implementer of Application A and it lasted for 26 minutes. The third and fourth interviews were held on February 27, 2018. The third interviewee was a user of Application A and the interview was 17 minutes in length. The fourth interview was with an implementer of Application B, with a duration of 32 minutes.

The fifth interview was on February 28, 2018. This interview was with a representative of the Application C. The interviewee was not aboard in the initial implementation of Application C, as the app was acquired in a company takeover. This interview was conducted via telephone due to technical issues with the Skype microphone. The interview lasted for 34 minutes, and could not be recorded, so the answers were typed down on a computer. The sixth interview was with a user of Application B and took place on March 1, 2018. The length of this interview was 13 minutes. The last and seventh interview was on March 6, 2018. It was with an implementer of Application D and its duration was 21 minutes.

The question lists that were used for the semi-structured interviews can be found in the appendices. There are two lists of questions, one used for the interviews with the implementers and one with the users.

3.4. Interviews

INTERVIEW INFORMATION		INTERVIEWEE INFORMATION		
DATE	APPLICATION	IMPLEMENTER	GENDER	POSITION
23 February 2018	Application A	Implementer A	Male	Co-Founder and Head of Digital Products
27 February 2018	Application B	Implementer B	Male	Performance Business Digital Lead
28 February 2018	Application C	Implementer C	Female	Director in Product Marketing
6 March 2018	Application D	Implementer D	Female	Disruptor in Healthcare

Table 2. Implementer Interviews.

INTERVIEW INFORMATION		INTERVIEWEE INFORMATION			
DATE	APPLICATION	USER	GENDER	AGE	POSITION
27 February 2018	Application A	User A	Female	34	Programmer

1 March 2018	Application B	User B	Male	42	Account Manager
23 February 2018	Application C	User C	Male	46	Welfare and Local Government Sales

Table 3. User Interviews.

3.5. Introduction of Applications

3.5.1. Application A

The core purpose behind Application A is to be a social training diary. It was launched in 2009 and initially operated as a free consumer service. Soon after the release, however, it was changed to a business-to-business model. Today, there is still a free version of the application available for individual consumers, but the focus of the business is to sell content to companies for their employee wellbeing campaigns. Ideal users for Application A are the ones that need to be motivated to exercise in order to keep themselves healthy.

3.5.2. Application B

Application B is a training diary and it was released in 2010. The company's core focus is development and sales of various devices and equipment. The application was developed to support and boost the user experience of these appliances, but it also includes communal features. The core target group and users of Application B are people who do sports above average and are ready to pay for pricey quality equipment. However, the consumer segment of this application has been broadened to cover more of the "regular" type of exercisers as well.

3.5.3. Application C

Application C was acquired by company X in 2016 (the interviewee for this research comes from company X) and its focus is on supporting various health devices. The application is targeted for a wide range of individuals to observe their activity by tracking their personal data. It also offers open interfaces for different health-related companies to use the data further, e.g. fitness programs and medical centres. Application C also includes programs that are targeted to users with specific health desires. The ideal users of Application C are those interested in health and wellbeing.

3.5.4. Application D

Application D focuses on preventive healthcare and promotion of health. It was released in 2018, meanwhile this research was conducted. However, the company has been offering a similar service for five years in collaboration and integration with external service providers. Their business model is to offer health and wellbeing services for companies with a fixed price per month. The ideology behind Application D is that a single platform would contain all services related to one's health, wellbeing, and sickness. The ideal users of Application D are people who want to take care of their wellness and specifically those that need support in preventive healthcare.

	Application A	Application B	Application C	Application D
Year of release	2009	2010	2016	2018
Target audience	Mainly businesses, but also individuals	Individuals	Individuals, families, businesses	Businesses
Ideal users	“Yellow” category: people who exercise to some extent, casually and not too seriously	“Green” category: top athletes and people who exercise greatly	Health-concerned people at any level in exercising	People who are keen to take care of their wellness
Magnitude	International	International	International	National
Description	Social training diary	Training diary and sports community	Health tracker	Platform for all health and wellness services
Purpose	Sharing, encouragement	Tracking and sharing, adding value to devices	Tracking, adding value to devices	Preventive healthcare
Philosophy	Exercising should be fun, not competitive	Community where every move counts	Inspiring and improving daily wellbeing	Healthcare should be preventive, not repairing
Compatible products	- No proprietary ones - Integrated with many trackers and devices	- Watches - Supports many trackers	Smart scales, watches, blood pressure monitors, activity trackers, etc.	Integration with wellness trackers underway
Data tracking	Steps, distances, activities	Steps, distances, speed, routes, calories	Steps, heart rates, activities, weight, blood pressure, sleep, body composition	Health information and history
Goal-Setting possibilities	- Targets for steps, activities, and other health behaviors	- Individual targets for steps and distances	- Daily and weekly targets for steps - Weight targets and the pace of change	- Individual wellness and health targets
Rewards	Badges, medals	Cups, Prizes from competitions	Badges, prizes from competitions	None yet
Programs & competitions	- Wellness campaigns and challenges for companies - Versatile training programs	- Events - Online competitions	- Wellness programs for companies (competitions, challenges) - Programs for individuals (sleep, pregnancy, body composition)	None yet

Progress tracking	<ul style="list-style-type: none"> - Own progress data available - Comparison and competition with others avoided - Feedback 	<ul style="list-style-type: none"> - Group and individual data available - Comparison to personal records - Comparison with others - Feedback 	<ul style="list-style-type: none"> - All data available: progress and trends - Advice, "recipes" for improvement - Feedback 	<ul style="list-style-type: none"> - All information and history available - Inquiries and questionnaires - Contact channels - Feedback
Other game elements	Points and levels	Points and levels	Leaderboards	None yet
Social elements	<ul style="list-style-type: none"> - Communities - Coaching - Sharing activities, photos, and stories - Encouraging friends (likes, comments, icons) 	<ul style="list-style-type: none"> - Communities - Sharing activities, photos, and videos - Following other users 	Connecting whole family to the same device and service	<ul style="list-style-type: none"> - Wellness coaching (group and individual) - Meetings and discussions
Communities	<ul style="list-style-type: none"> - Forming groups with users one already knows 	<ul style="list-style-type: none"> - Forming groups with other users interested in the same sports - Sharing routes with others nearby 	<ul style="list-style-type: none"> - None inside the application - Communities and teams in corporate campaigns 	None yet

Table 1. Introduction and Main Features of the Applications.

3.6. Limitations of Methodology

There are three reasonable limitations regarding the collection of data through these seven interviews. Firstly, the sample sizes of both the applications and the users could have been larger. The choice of focusing on four applications ensures a deeper understanding of these applications, but on that account, the breadth of the research is rather limited. Users' point of view is also more elaborative and insightful through interviews, but a larger sample size and a survey would have enabled a larger generalization of findings. Secondly, the limited amount of time reserved for the interviews diminished the ability to get more profound answers to the topics. Thirdly, the missing of the fourth user limits the analysis from being fully encompassing.

4. FINDINGS

4.1. Engaging with Game Elements

4.1.1. Social Rewards, Badges, and Points

There is a lot of purposefully implemented gamification in Application A. The game elements in the app are mainly used to visualize users' achievements. On an individual level, there are badges and medals that are received from different accomplishments. For example, the user has gone to the gym 50 times a year and receives a medal. The app particularly encourages users when they are at the beginning of training. There are badges in the Application C as well. These badges are received for example when the user has gained particularly significant amounts of steps in a day.

Systems based on points and levels are used in Application A and B. When users perform certain actions, they receive a certain number of points, which then helps them rise to the next level. In Application A, the points accumulate e.g. from the amount of training, number of friends, given encouragements, or a reached weekly target.

Another example of a gamified feature in Application B is a number that shows how many hours the user has been exercising during the past month. According to Implementer B, many users of the app considered this number highly motivational and helpful in reaching their goals. For example, a user wants to maintain the number always on 30 and is therefore motivated to exercise more. This feature highly centres on goal-setting.

4.1.2. Campaigns and Competitions

In addition to individual level game elements, there are campaigns offered for businesses that also contain gamification. Organizations involved are given a common goal, e.g. collecting certain number of kilometres or steps, and everyone strives to reach this goal together. The gamification in these campaigns can be further emphasized by putting up a playful competition between teams, or even countries

within the same organization. Moreover, these competitions often include rewards, for example products or other non-monetary benefits.

In Application C, the main gamified features are different competitions and challenges. These competitions are designed for organizations and they contain different goals according to the type of challenge. Most of these competitions measure the amount of activity, such as walking. Some of them includes a set distance, and the group that completes the journey first, wins. The distance is usually a real distance to an existing place, e.g. trip to Grand Canyon, or a challenge to walk 'To the moon and back' as many times as possible. The idea of this is to bring concreteness to the competition. Another type of challenge in Application C has a 'due date', and the group that has managed to 'get further' until that specific day, wins.

Rewards are also integrated into these challenges and competitions; the winner team usually gets a prize. According to Implementer C, the company in question usually determines what the prizes are; for example, in one activity campaign for Company X employees, the winner team was given health products as a prize. In addition to the corporate campaigns, there are also more generalized challenges in Application C for individual users.

Most of the game elements discussed above are also highly social. These aspects will be discussed more closely in the following sections regarding social elements. There are no specific game elements in Application D, and neither there are plans to build any into the app in the near future. However, according to Implementer D, a possibility of integration or collaboration with an exercising or health tracking service exists, hence Application D could access the world of gamification through this kind of collaboration.

4.2. Engaging with Social Elements

Game elements and social elements are deeply intertwined in the mobile health applications examined in this research. Gamification, in its entirety, has multiple social

aspects. Many game elements, such as competitions, teams, relationships, and social rewards, usually require other people. Consequently, in gamified applications, other people influence users' thoughts, emotions, habits, and behaviours. Social elements therefore influence the success of game elements, and vice versa.

4.2.1. Social Core

The initial thoughts behind the development of applications A and B were very similar with a strong focus on the social aspects. The idea behind Application B was that by ensuring the communality of the application, it will be easier to motivate users and get them excited about doing sports. Likewise, Application A was particularly developed on a social foundation, with an initial purpose of sharing your exercises with your friends and supporting them from afar. Applications C and D, on the other hand, are using considerably less social elements.

In Application A, the key mechanism is the encouragement of one's friends. Implementer A underlines that if the user has enough friends in the service, and the atmosphere is good, it is already enough to become motivated. Similarly, Implementer B finds that receiving comments and attention from others can increase the motivation for exercising. The same principle applies conversely; seeing exercises that others have shared online may motivate an individual to become more active as well.

4.2.2. Social Support

According to the Implementer of Application A, the app has been seen particularly motivational amongst rehabilitation groups. The motivation maintenance is needed especially when the intensive rehabilitation period ends, but exercising is still crucial for full recovery.

“There is a great deal of stories from groups of people, who have been encouraging each other for years in our service after the actual rehabilitation. They may not be easily motivated alone, but when they get peer support and a group that is in the same situation and encourage each other. This is an example of an ideal situation that we have been able to generate.” (Implementer A)

User A has experienced the motivational effect of Application A concerning recovery. However, her viewpoint for motivation is not social, but personal. She had an operation on her back a few years ago. After the surgery and at the beginning of the recovery, she had a rehabilitation period with a private physiotherapist. According to her, it was a long recovery back to her current condition, and Application A was used to track everything related to rehabilitation.

“I tracked it all carefully, how much I had been exercising. I did gym workouts firmly three times a week, and aqua jogging also three times a week and I also tracked muscle maintenances and massages. I marked it all there to keep up on what I had been doing.”
(User A)

After the period, she found Application A useful for getting to a certain point – but when her normal life routines were found and stabilized, the motivation and eagerness towards the application were immediately decreased. She felt she “could not get the same benefits out of it anymore”.

4.2.3. Comparing with Others and Own Records

There is a feature in Application B called “Personal Best” and this tool can be exploited by the users when observing their own previous records and development within a time period. The objective of this feature is to motivate users to improve their performance.

In addition to one’s own records, Application B also shows the average results of other users within the same age group. Therefore, the user is able to compare one’s own records with others. Social pressure comes into play, as the performance of others acts as a motivator to improve one’s own performance. One’s own level is shown as a percentage in comparison to others, and the user can also see how much would be needed to get to the next level.

Motivation creation by social comparison is also evident in Application C’s wellness programs. They are designed for organizations and the purpose of these programs is to virtually compete against other groups in some activity. The comparison between

the competing groups is enforced by messages of encouragement. Messages may be something like “Keep it up Group 3, to reach Group 2!” In addition to social comparison, this competition setting represents pure gamification. Moreover, the encouraging messages, for their part, are examples of positive reinforcement, hence also gamification. Once again, it is evident how gamification and social elements cannot be addressed completely separately.

User C considers social pressure as a good motivator especially when associated with a competition or race. He gives an example of a running competition he attended, where the intention was to run a specific distance within a month. The distance was measured by tracking with a mobile application. He refers to Application X, which he used as a tracker in the competition, and points out the motivational effect of receiving the prize after reaching the required kilometers. However, as particularly motivational he emphasizes the social pressure to perform well compared with other people.

User B considers his use of exercise applications almost entirely individual. He follows people but does not participate in running groups or equivalent communal activities. However, as far as his skiing speed is concerned, he pays attention to social aspects. He uses Application X to compare the new speed with his own previous records, but also with the people he knows and who have gone the same route. He finds it hard to say, if comparing with himself or other people is more motivational.

Implementer B has pointed out the universal fact that when it comes to physical exercising habits and especially when sharing them online, people tend to exaggerate. For example, in application A, all data is not tracked by devices and trackers, but the user is also able to add activities. That is a potential ground for made-up activities. Sharing exaggerated or even untrue statements concerning one's exercises might increase the amount of negative social pressure amongst other users.

4.3. Implementation of Consumer Psychology Theories

There are a few consumer psychology frameworks and models that were precisely considered and used in the development of the applications. The theoretical backgrounds behind Applications A, B, and D largely focus on social aspects. Application A is partly based on the social object theory. Application B has carried out their own internal social study. Application D has had its focus on the social GROW-model of coaching. In addition, some theories were not specifically brought up by the implementers but are distinctly observable through the functions and features of the applications. Also, there are no results from the theories implemented in Application C, as the interviewee was not aboard in the implementation of it. The following sections will discuss each of the used frameworks in more depth.

4.3.1. Goal-Setting Theory and GROW-Model

In Applications A, B, and C it is possible to set goals. In Application C, the user can switch on a tracker and set a goal to aim at, e.g. 10 000 steps a day. When the goal is reached, a bell rings and the user gets a star. There is also a personal 'trend line' for each user, from which it is possible to see the trend levels; the level where one is currently, and the level where one is reaching.

User A has set a goal in Application A of doing sports at least five times a week. However, for her the activity of goal-setting is not motivational. In fact, she associates goal-setting as one of the factors why she repetitively becomes frustrated with the application. Conversely, she also argues that a health-tracker app would be pointless without the possibility to set goals.

Goal-setting theory highlights that giving feedback is crucial concerning the ability to set goals and hence a critical element for user engagement. As stated previously in this paper: If no knowledge of progress and personal performance is given, meaningful goals cannot be set (Erez, 1977).

The concepts of instant and long-term feedback have been realized and concretized into the features of Application A. The user gets feedback from the application and

from the other users. The encouragement and comments of other users are examples of instant, short-term feedback. Medals, points, and congratulation messages, on the other hand, can be seen as not only short-term but also long-term feedback.

Likewise, Implementer B has realized the importance of feedback. However, one of the features of the application, the already mentioned 'Personal Best', is lacking the element of instant feedback and hence not considered addictive enough by Implementer B. It should be brought closer to everyday life; the 'personal best' information should be given instantly after the exercise, instead of giving it occasionally and after a long time. This way it would be easier for the users to set themselves goals.

Application A also offers coaching services for its users. For its part, coaching also contributes to motivation building, as "having someone who looks after you and advises you to use the digital service" as Implementer A puts it.

Likewise, the psychological vision behind Application D derives largely from the world of coaching and the GROW-model, but also complies closely with the theories of goal-setting and self-determination. The user's own thoughts and desires are the central point of the service. Users of Application D can answer different inquiries regarding their current situation and health. However, the objective is neither giving lectures on the state of one's health nor presenting ready-made programs or solutions for betterment, but the user is asked to share their own interests. The direction of treatment depends on the user's intrinsic wishes, choices, and needs.

4.3.2. Reinforcement Theory

The exploitation of reinforcement is distinctly cognizable in Applications A and B concerning the use of positive reinforcement tools; extrinsic rewards, awards, medals, and points. Also, in Application C, badges and prizes received from competitions demonstrate reinforcement theory. Implementers of these applications described these reward systems but did not acknowledge having used the theoretical framework of reinforcement in the development of these systems.

As mentioned above, Application A has a reward system that awards its users by medals and congratulation messages for reaching milestones; e.g. “You have gone to the gym 70 times this year”. According to Implementer A, the users often shape their activities and exercising habits partly based on those medals.

User A finds these rewards entertaining, however, she does not consider them necessarily as “prizes” for an achievement, but rather as interesting statistics that cause her to think how many times she has been doing a certain activity. The rewards do not create motivation for her directly, but the interest toward seeing the progress and results may act as an engagement builder; it encourages the user to repeat the activity and continue to do sports. Likewise, User C, does not find external rewards motivational at all, as he has internal sources and reasons for motivation, therefore is already motivated intrinsically.

However, as a particularly interesting feature, User A highlights a team-based rewarding activity, where the users can encourage each other by sending different icons. When a specific social aspect is added, the rewards are seen more interesting.

4.3.3. Social Object Theory

Social object theory has been purposefully implemented in Application A. In light of this theory, Implementer A highlights that a social network cannot be based only on the fact that two people know each other, but more strongly on what they share. The social object is shared by one and received by another; thus, the object needs to interest both parties equally to be qualified as ‘social’.

Application B includes a possibility to follow other people, like and comment on their activities, follow activity feeds, and participate in events. However, Implementer B points out that rarely users set out to comment on unknown peoples’ training sessions. Therefore, it is not enough to have the ability to comment on other users’ activities, but you also need to know them. Consequently, for the user to experience a fully functional, social environment in the application, it is actually pivotal for the user to know some of the other users as well.

Application B has attempted to get around this problem by adding a ‘communal attribute’, alias a social object, to some of its content. For example, any user can create a route for themselves to go running and then share it to other users, so that users living in the same area can also use the route. Thus, even if the users are unknown to each other, a communal element exists, and the experience becomes more social. In this case, the common route serves as the social object.

4.3.4. Study on Sociability and Activity

According to Implementer of Application B, a few years ago they cooperated with a researcher regarding the social aspects of user behavior. The focus of the study was to investigate the correlation between user activity and sociability. The sample of the study was drawn from the user data and was approximately 10 000 users.

In Application B, users can choose whether they want to remain private or become public. In the study, the attributes chosen to reflect ‘sociability’ of the user were whether the user was public, as well as the number of followers, ‘shoutouts’, and ‘thumbs-ups’ given and received. The composition of these features was compared with the amount of exercises and activity of the user. The results showed that the correlation exists; the more social the user was, also the more active the user was. However, the result is rather directional, as it is difficult to draw explicit conclusions on the causality of these two things and it partly remains indefinite.

4.4. Motivations of Users

4.4.1. Exercising Habits

USER	TIME OF APP USAGE	USUAL TYPES OF EXERCISE	AMOUNT OF EXERCISE
User A	Approx. 6 years	Horse riding, walking, mountain biking	6 times/ week

User B	Approx. 6 years	Running, skiing, other outdoor sports	Daily
User C	Approx. 1.5 years	Running	3-4 times/ week

Table 4. Exercising Habits of Users.

4.4.2. Reasons for App Usage

User A has been using Application A nearly since the release of it, now at least for six years. Her usage has been invariably periodic; occasionally she tires of the application and deletes the app, sometimes even for months, until after a while puts it to use again. User A initially started to use the app with a goal of doing more sports, as she wanted to track the amount and quality of her exercises. Currently, her main interests regarding the app include the quality of her sleep, and the number of steps per week. Also, Application A functions as a reminder to hold rest days, as it shows on the app how many days she has been exercising in a row.

The reason for Users B and C to begin the use of health apps was the acquisition of connectable devices, as the app enabled the tracking of activities. User B purchased a wearable watch that was connected with Application B, and User C purchased a smart scale connectable to Application C. In the beginning of use, User B wanted to primarily measure distance, but after years of usage, also other factors have come along: tracking of heart rate, distance in altitude (e.g. climbing meters), and navigation in new routes. User C uses Application C mainly as a platform to gather health data from several devices and applications. The tracked data includes heart rates, steps, body composition, and weight.

4.4.3. Strongest Motivators

Users A and B find both the individual tracking and the social features motivational. Both regard the features of individual tracking as slightly more motivational but mention the social aspects as well.

The main activity for her is horse riding, but the app does not offer measures for development in riding that she would consider interesting to follow. She also goes to the gym, mainly as support training to keep balance. User A names the timeline as the most motivational feature for her in Application A. All the exercises and activities accumulate to the same place and hence, it is effortless to follow the amounts. Neither goal-setting nor external rewards are motivational for her. However, she mentions a workplace team-account, which is used to follow and encourage others, as having slightly motivational features.

User B finds speed tracking as the most critical feature to motivate him to use the app. Another important feature mentioned is related to the navigation and communality of the jointly created routes. User C mentions goal-setting as a good motivator, but only when it is related to competitions.

4.5. Outcomes for Organizations

Implementer B discloses a universal challenge for organizations in the business of health applications. It is easy to collect versatile data on the behavior of the application users, but the ultimate challenge is to find insight on those potential consumers who are not yet using the product. Therefore, it also creates difficulties on expanding the consumer base.

4.5.1. Overall Performance

According to Implementer B, the development of Application B has arguably had a positive influence on the company's revenue. However, he finds it difficult to say precisely, as their revenue consists mostly on the sales of devices. Implementer B considers it presumable that the consumers would less likely purchase the devices if the supportive application did not exist. Though, it is more difficult to estimate the influence on consumers' purchase behavior if the application had, for example, more features or less features.

4.5.2. Employee Wellbeing

The companies behind both Applications A and C have their apps in use amongst their own employees. For example, Application C has been incorporated into activity campaigns for the employees. The results of one these campaigns have turned out to be radical, regarding employee wellbeing. More than half of the participants changed their daily habits, started to walk more, and experienced less stress. Also, the blood pressure went quite extensively down.

Furthermore, Implementer C underlines how the activity campaign affected the entire culture in the workplace. Even the most deeply rooted norms were changed to healthier ones and to entire opposite to what they had been. For example, using the elevator instead of stairs became disapproved, and going for a walk instead of closing oneself in a dark meeting room to attend a telephone conference became recommendable. Also, the stairs of the workplace were decorated with messages of encouragement.

Furthermore, Implementer C points that these kind of activity campaigns can have direct impacts on the organization's performance and results, as people become less stressed. Firstly, the working atmosphere is better, and secondly, there are less sick leaves related to depression or burnout.

Regarding their employee health, Implementer A points out that most of their employees have been highly active in their habits even before the use of Application A. He states that the app has surely played some role in improving employee health but finds it difficult to say the extent to which the improvement is deriving from the application and to which from other grounds.

Application D is not yet in use within the company's own employees at any level. However, there have been considerations on whether the app should be used to measure the wellbeing of their employees. This could be done utilize for example the "workload questionnaires" that are used in their own application for analyzing the wellness of employees. However, the subject has been seen rather divisive, as personal health issues might be difficult or unpleasant to share with one's employer.

5. DISCUSSION AND ANALYSIS

5.1. Social Elements Complete Game Elements

As mentioned repeatedly in this paper, social elements and game elements cannot be separated, as they are strongly connected. In fact, the influence of social elements on game elements seems to be much stronger than the other way around. Social elements are often required to get the full benefit out of game elements. The following paragraphs will describe some of the game elements that become more motivational when added to a social context or connected with social elements.

Firstly, goal-setting is more motivational in communal activities. User A does not find the activity of goal-setting in the application motivational. Likewise, User B rarely sets himself goals in the application. When he does, the exercise is usually a part of a sports event. User C has set targets in the application for weight, steps, sleep, and weekly amount of running, but does not find them as particularly functional motivators. Outside the application, User C finds goal-setting highly motivational when doing sports. Like User B, he mostly sets himself goals when participating in a competition or training to one. Competitions and sports events are social in many aspects.

Secondly, rewards can be less motivational when they have a minor social aspect. User B has not noticed any use of rewards in the application, and User C states that rewards do not motivate him at all. However, when it comes to User A, the effect of social elements in the activity of rewarding can be seen. For user A, badges for achievements are just “interesting statistics” and not seen as motivation creators. However, User A finds the ‘social icons’ more motivational. These icons are sent and received inside the community to encourage fellow users. Even though the badges are also ‘social rewards’, in Application A they need to be purposely shared to become truly social, as otherwise they are visible only for oneself.

Thirdly, the activities of progress tracking and feedback receiving can also include social features to strengthen the motivational effects. For example, User B observes his progress by comparing his running or skiing records with others; either with people he knows or with those who have gone the same route. User A, on the other hand,

finds the comments of other users more encouraging than the slightly negative progress reports from the service provider.

In Figure 4 below, the applications are located on two scales according to the extent to which they are social (the upper scale) and gamified (the lower scale). The correlation between these two types of elements can be detected from the locations of applications. Application A is located on the right end on both scales and conversely, Application D on the left ends. Applications C and D are both placed close to the midpoint.

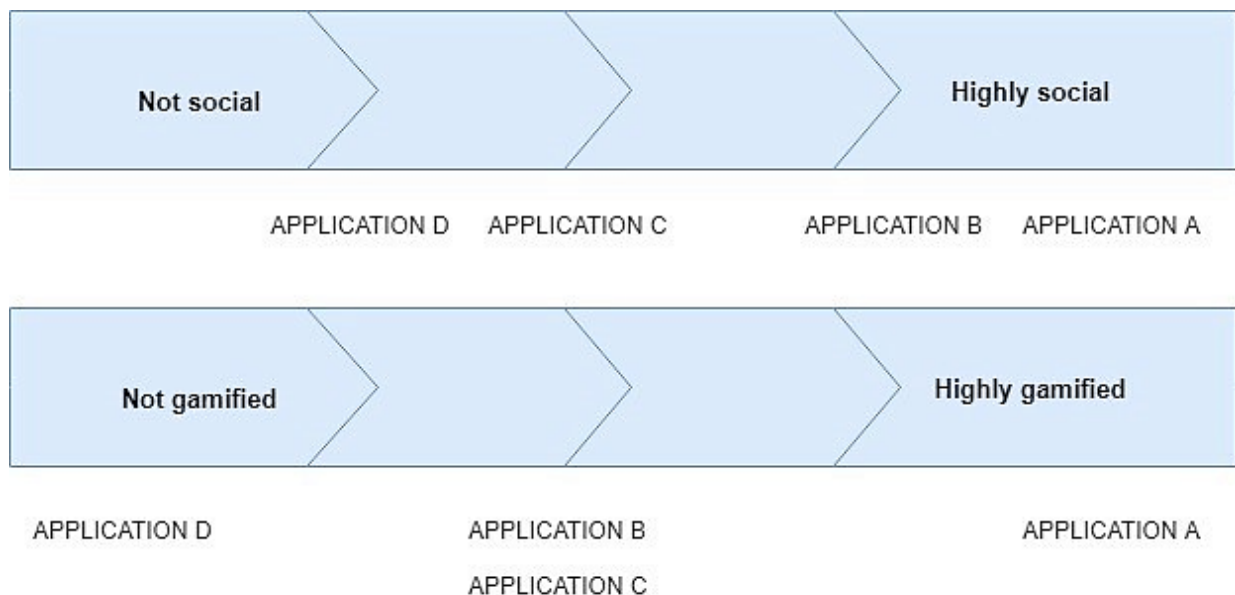


Figure 4. Correlation between Social and Game Elements.

5.2. Data-Driven and Experience-Driven Applications

There is a difference between the driving forces and the core purposes of the health applications. It could be presented with a scale; strongly data-driven apps on the left end, and strongly experience-driven ones in the right end. Many applications that have their focus on tracking (e.g. steps or distances), would locate more to the left side as more data-driven.

This distinction complies with the proposition of Bowden et al. (2015) according to which service relationships can be divided to two groups: 'functional and utilitarian' (F/U) and 'proactive and co-creative' (P/C). Data-driven apps represent the F/U category, and experience-driven ones, for their part, belong to the P/C category. According to Bowden et al. (2015), P/C-natured services generate higher user engagement. However, this engagement is only proven to be higher in a short term.

Applications A and C can be used as examples for this differentiation. Users' postings and activity entries in Application A represent a highly experience-driven approach; the postings do not only show the number of steps, or the heart rate curve, but the user can write little stories, and attach photos to the exercise updates. Implementer A underlines that the created data needs to be something that not only user but also user's friend finds interesting. Hence, as for Application A, the strong focus is on the experience and sharing, and the tracking part is only a necessity. Moreover, Application A does not have any devices of its own, so the full focus regarding the app can be put into the experience.

On the contrary, Application C is fundamentally intended for users to see and track data, collected by diverse devices. Thus, Application C is more of a functional and utilitarian service. Application B also leans more to the data-driven end. It does contain lots of experience-creation and social elements, but still its core is data-driven and centered on data tracking. Implementer B mentions the limitations regarding the creation of communality to the app, by pointing out that Application B is more of an individual than social service. Hence, the functional needs of consumers and the features of the devices are the primary focus. The social and 'fun' features come secondarily.

Figure 3 shows the scale with data-driven (F/U) services to the experience-driven (P/C) services. All applications would locate somewhere midway on the scale, having features of both. However, the applications are positioned in the scale below according to their most prominent characteristics, and with respect to each other; Application A as the most P/C, and Application C as the most F/U of the four. It needs to be noted that contrary to Figure 4, this division is not grounded on the level of social or gamified

features. Comparison of Figures 4 and 5 verifies the difference, especially when looking at the location of Application D.

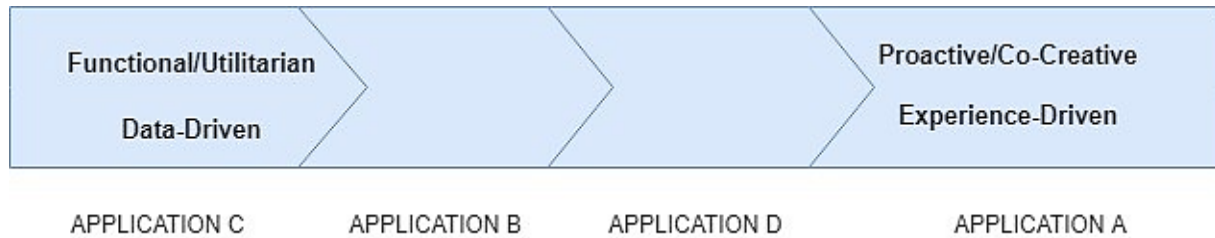


Figure 5. Scale from Data-Driven (F/U) to Experience-Driven (P/C) Applications.

5.3. Necessity of Motivation Creation

The functionality of both gamification and social elements in mobile health applications is largely dependent on the nature of the application, and the type of people the application is targeted to. Application B offers us an apparent example of this. The target group of the app and a specific device were widened to cover, not only top athletes, but also fitness type of people and people with exercising habits closer to average. In this case, the use of game elements was considered more essential. This is because the core purpose of gamification is to motivate and evoke emotions. As stated in the literature review of this paper, quantification provides the rational side, e.g. self-tracking, while gamification the emotional side, e.g. motivation (Maturo & Setiffi, 2015).

Top athletes and people who exercise considerable amounts, are usually already motivated, and do not use exercise applications to get motivated. Instead, they have other reasons, e.g. desire for tracking distance or speed. User B is an example of a person who exercises considerable amounts and, according to his own words, is already motivated to exercise. Moreover, any of the social rewards do not have any

motivational effect on his exercising habits. User B finds the quantified elements satisfactory enough.

In addition to gamification, social interaction is also notably more significant when motivation creation for the user is needed. Consequently, Application B's connectable devices that are targeted for these 'regular' and 'fitness' types of people contain various motivational elements, e.g. guidance and encouraging messages.

Application A offers another example of this connection. Implementer A divides people into three groups according to their health and exercising habits:

“If people were divided into groups according to traffic lights – if ‘red’ ones are already patients of healthcare, and ‘yellow’ ones need to be kept motivated to do things and take care of themselves, so that they would not end up in the ‘red’ area.”

Thus, the 'green' group would consist of the already highly motivated people that take health seriously and optimize their performance. According to Implementer A, the ideal users of Application A are particularly those in the 'yellow' area. They still need to be motivated, and hence, Application A includes a great deal of both social and game elements.

5.4. Intrinsic Motivation Leads to Behavior Change

Implementer C has concretely pointed out the effect of intrinsic motivation to behavior change. Firstly, everyone acquiring a tracker or starting to use a health app should first measure their current state of health, e.g. whether they are doing too much or too little activities. Not until the current state of health is truly realized, habits cannot be changed into healthier ones.

It is particularly significant that the user makes the realization by one's own. Motivation to health improvement needs to be intrinsic in order to change the behavior

permanently. This complies with the conceptual model presented in Figure 2 in the literature review. Intrinsic rewards create intrinsic motivation, which leads to long-term engagement and hence, a permanent change of behavior.

Implementer C gives a concrete example of this. They had been working with patients who had previously got a stroke. Each of the patients were given a blood pressure monitor and health app to go home with. The significant part here is that they had been preached by doctors for years on having a high blood pressure. In other words, they had all the information needed to change those unhealthy habits. However, not until they measured it themselves and saw the negative results with their own eyes, they realized that the doctors had been right for all those years. The motivation to change the behavior needed an inner realization.

The same phenomenon is evident in the use of social rewards. Any of the interviewed users did not find external, social rewards (e.g. badges, medals) motivational. As presented in the literature review: External rewards build mainly extrinsic motivation, hence only short-term engagement. In the present study, the users did not consider the badges motivational; thus, even short-term engagement was not considered happening in this case.

5.5. Positive vs Negative Reinforcement

When thinking about the theory of reinforcement, the aspect of positivity is crucial. As mentioned previously in this paper, the theory states this message: When behavior leads to positive consequences, the individual is more likely to repeat it, and when the behavior leads to a negative outcome, it is not so likely repeated (Maleka, 2014).

Application A's virtual competitions include many types of extrinsic rewards and prizes. However, as underlined by Implementer A, the point is not to award a grand prize to a single winner, but to give out several smaller prizes to many people, or even everyone, to keep them motivated to participate. What these prizes are, largely varies depending on the case. The potential disappointment of other participants can be considered as a form of negative reinforcement, leading to side effects opposed to motivational. However, this is highly dependent on the context and nature of the competition.

Signs of negative reinforcement appear also in other forms. As mentioned above, User A has pointed out her frustration at the function of goal-setting. This frustration is mainly caused by a feeling that exercising is too ‘achievement-centered’. The feeling partly accounts for frequent emails from the app stating “You did not reach your goals”. These messages could be seen as examples of negative reinforcement or negative pressure. Negative reinforcement may cause users to stop the behavior; at least for User A, the frustration to this has frequently caused her to uninstall the entire app.

“You are at work on Monday evening and open your email, and there is a message waiting that says ‘you did not do enough sports last week’ - Life is already hectic as it is, with strict schedules and all, and if you, to top it all off, have an app that tells you what to do, or reminds that you, once again, did not reach a goal. Well, it is an irritating thing and eventually the reason for stopping.” (User A)

Application C uses a similar reinforcement method in integration with a smart scale. User can set their weight and target weight. If the user is falling behind in the progress or has been less active, the app might refer to the set target weight, and notify the user that they are far from the target and should become more active.

Naturally, there are different types of people who get motivated from different things. Some may find the strongest willpower precisely from hearing that they ‘didn’t reach a goal’ or that they are ‘far away from their set target weight’, but there are also people who may find this aversive.

Also, the number of emails can be perceived negative from the user’s viewpoint and even deteriorate the motivation creation. For example, User C thinks that the excessive amount of email decreases his overall interest in the messages, rewards, and badges.

5.6. Sensitiveness of Health Issues

Health issues can sometimes be challenging for businesses to address. When it comes to the most personal and delicate things concerning health, people might become

unwilling to share them. Even the most sociable people can be highly sensitive to health-related things and find it unpleasant to discuss them with other people.

Application D has its main focus on pure healthcare. It does not offer online communities or means for interaction between users but is centered upon a personal service and user experience. The implementers of this health app are widely experienced in the occupational health business and have made an important realization; their customers really appreciate and prefer individual service.

“We have tried it a bit, how willing people would be to take part in a communal activity. It is interesting how elsewhere in the world it is such a big theme, but especially when we are talking about, for example, problems with sleeping, people are very sensitive and want strictly individual service. Hence, it is not the primary direction in which we are planning on heading.” (Implementer D)

On the contrary, Application A focuses more on exercising and the ‘fun side’ of health promotion. Therefore, people find it more comfortable to share their feelings and experiences with other people.

6. CONCLUSION

This section of the thesis will conclude the paper. Firstly, it will go through the main findings of the study. Secondly, there will be a discussion regarding the implications this thesis has for international business, and the final part will consist of suggestions for further research.

6.1. Main Findings

The main findings answer the research questions of the study. The research questions will be presented below afresh, followed by the findings concerning each question.

Question 1. How Finnish organizations are using gamification and social elements in their mobile health applications?

The present study supports the proposition of previous research that there is an inseparable relationship between gamification and social elements. It was found that specifically, the use of social elements reinforces the motivational effects of gamification. Consequently, also the use of both types of elements in applications goes hand in hand. The extent of use is largely depending on the initial purpose of the application.

However, the game elements that *are* used, regardless of the amount, are similar among the apps. The principally used game elements appeared to be rewards and point systems. All the rewards used are social and they present themselves in many forms: badges, prizes, and medals. In addition to points and rewards, other considerably used game elements have proven to be competitions; including teams, leaderboards, and prizes. These gamified competitions are mainly used in business environments; as a part of employee wellbeing campaigns. When it comes to gamification in progress tracking, feedback is a commonly utilized. This element appears in all four applications. Also, the importance of both instant and long-term feedback has been realized.

The most used social elements are communities and groups. In Applications A and B, it is possible to form groups, follow other users, and encourage them by messages, comments, and likes. Competitions include lots of social elements, e.g. forming relationships with team members.

All the applications seem to be quite aware of their target audience's wishes, which have been used as metrics in evaluating whether it is successful to implement game elements or not. As stated in the literature review of this paper, when a company has a deep understanding of the motivation behind consumers' decisions and actions, game components and stimuli of the right kind can be implemented successfully (Gatautis et al., 2016).

Question 2. Which consumer psychology theories did organizations consider when developing these applications?

The main frameworks used and considered in the development of applications A, B, and D are different social models. The foundation of Application A is highly social, and the primary consumer psychology theory considered was the social object theory. The application also represents the implementation of reinforcement and goal-setting theories, even though these were not namely integrated whilst the development.

In the continuous development of Application B, the company has conducted a study concerning the correlation between user sociability and activity. In addition, Application B includes aspects deriving from the reinforcement theory and the goal-setting theory, however, these theories were not considered while developing the app. There is no knowledge on the psychological theory considerations regarding Application C, as the app was not initially implemented by the interviewee's company. The GROW-model of coaching as well as various frameworks from the field of motivational psychology were considered in the implementation of Application D.

Question 3. How do the means for user engagement and motivation creation differ between the applications?

The means for motivation creation between the four applications differ in many ways and for several reasons. As stated in *Question 1*, the applications are all using similar social and game elements, but very different amounts. Application A uses both means to a high extent, whereas Application D does not use gamification and only a few social elements. Applications B and C fall in between these two extremities.

Also, the division of applications as either data-driven or experience-driven plays a role in the implementation of game and social elements. Data-driven applications primarily focus on the functional aspects and only secondarily to social and 'fun' activities. Application C as the most data-driven, also has less social and game elements. However, experience-creation and social elements are not correlative. Application B is largely data-driven but has many social elements, compared with the highly social and experience-driven Application A. Also, the healthcare-centered Application D is very experience-driven, even though it is not gamified and only social through coaching.

The influence of target group becomes apparent when considering the need for motivation creation and comparing Applications A and B. Application B targets the top athletes, therefore motivational tools are not so crucial in the app, compared with Application A, which targets more regular type of individuals.

There are differences in the implementers' perceptions of motivational features and users' perceptions of motivational features. As presented in the literature review, external rewards rarely create long-term engagement, and this study supports that fact. Badges and other external rewards are largely utilized in the applications; however, they are not seen as motivational by the users. Also, goal-setting activities are largely utilized in all applications, but these activities are rarely seen motivational.

On the other hand, many elements match the wishes of the users. Applications A and B focus on the creation of motivation through social and communal activities, and this is also considered engaging from the users' point of view. Application C utilizes

competitions and challenges that are perceived motivational. Application D, for its part, understands its users' needs and accordingly offers them individual services and hence helps them create intrinsic motivation towards preventive healthcare.

6.2. Implications for International Business

The significance of this research regarding the industry of international business can be derived from the world of mobile health. The industry is evolving and growing, and more and more health services are brought to the reach of everyone to their homes and to their workplaces. The wellbeing of employees is critical from the viewpoint of international business. Many jobs consist of hours and hours of sitting and people spend their days shut inside.

The importance of realizing that the everyday decisions, even as small as take the stairs instead of the elevator, are not only critical for the individual, but for the entire workplace and the organization. Employee wellbeing is not something organizations should cut from. Issues regarding health, starting from the most mundane but harmful habits, can become extensive. This does not end on the organizational level but is further extended to national and international economy.

On the other hand, consumers will benefit from more extensive knowledge about how organizations are using consumers' susceptibility to the persuasive elements of gamification. Awareness on motivation, engagement, and commitment creation, and even addictive elements that are added to everyday services should be in the reach of everyone that uses online applications and websites.

This research analyses gamified exercise applications that boost consumers' awareness of and motivation towards their own health, and improvement of health acts as one of the main reasons for using these applications. As obesity, chronic diseases, eating disorders, depression, and other health-related issues are becoming more and more common, all research that contributes to the subject is needed.

6.3. Suggestions for Further Research

Further research on the field is crucial understanding the constant spreading and development of mobile health phenomenon. Also, gamification is going to play a vital role in the future and will continue to expand, evolve, and change.

Several sources of academic literature have studied the connection between gamification and consumer engagement broadly and show evidence to the proposition that the use of game elements has an influence in increasing consumer engagement. In mobile health applications, gamification is considered as a successful motivator for users, making them more willing to improve their health.

This research has explored the use of social and game elements jointly and their shared influence on user engagement. However, it only gives a general outline of the used elements. This study does not address any specific features, or each one's relative share on the motivation creation and formulation of engagement. Further research should go deeper into the elements. Also, a more extensive analysis of the specific outcomes for the organizations could be one area to focus on.

To conclude, the strong relationship between gamification and social elements, which was emphasized in this study, would certainly be a potential subject to explore in more depth. For instance, the motivational influence of social and game elements could be further analyzed using a quantitative research approach and a larger sample size of users, to be able to generalize the results.

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APPENDICES

Appendix 1: Interview Questions for Implementers (in English)

History and Current State

1. Short background of the business? (i.e. when was it founded, how has it grown)
2. What was the initial purpose and idea of the application?
3. Do you have accessories that can be connected to the application?
What kinds?
4. Who are your ideal users? Ideal clients or businesses?
5. Are your own employees using the application?

Gamification

6. Could you describe the most important gamified elements used in the application?
7. What are the main types of motivators being used to engage consumers?

Rewards

8. What kind of rewards are you using?
9. Are the rewards offered on a one-time basis or over a series?
10. Are the rewards based on users' targets and achievements or more on general levels?

Social Aspects

11. What about the social aspect of the application?
12. Are you using internal network communities?
13. Is the application linked to other networking platforms?

Psychological Theories

14. I have been doing research regarding many theories about consumer psychology. I would like to know what prompted you to develop this application, and if you have taken any theories into account when designing it. (i.e. goal-setting theory, reinforcement theory, self-determination theory)

15. Did you design the application using a specific consumer psychology theory?
16. Which consumer psychology/behavioral theories did you consider when designing the application?
17. What aspects of consumer psychology are you specifically trying to appeal for?
18. Would you describe it more of a personal or social application?

Measuring and Outcomes

19. How are you measuring usage?
20. Which features have turned out to be the most successful amongst your users?

Plans for Future

21. Have you planned some changes in the application in the future?

Appendix 2: Interview Questions for Users (in English)

General Information

1. Company, occupation, age
2. How do you exercise and how? (i.e. which types of sports mainly)

History

3. For how long have you used this application?
4. Are you using other similar applications – which ones?
5. Are you using any accessories that help monitoring data and can be connected to the application – which ones?

Motivation

6. Why did you initially start using the application?
7. Why are you using it now, and to what purpose mainly?
8. What features of the application do you find the most motivational?

Goal-setting

9. Do you set yourself goals?
10. How often do you reach your goals?
11. What motivates you to reach your goals?
12. How do you feel when you reach a goal?

Reinforcement and Rewards

13. Have you noticed any use of rewards in the application?
14. How do you feel when you receive a reward?
15. Do you find the rewards (badges, points etc.) motivational?
16. Which ones are the most motivational?

Psychological Needs

17. Would you describe the use of the application more as a personal or social experience?
18. Does the application evoke emotions? (positive or negative)
19. Do you find yourself to be addicted to the application?

Social side

20. Do you know many people that also use this application?
21. Are you a part of a community or group inside the application? Do you know the members of the group in real life?
22. Do you find social features motivational?
23. Have you recommended the application to others?

Outcomes

24. Have you been satisfied with the application?
25. Is there something negative about the application?
26. Would you say your health has improved during the use of application?
27. Are you planning on continuing to use it?

Appendix 3: Interview Questions for Implementers (in Finnish)

Historia ja nykytila

1. Kertoisitteko lyhyesti yrityksen ja sovelluksen historiasta? (esim. milloin perustettu, miten kasvanut)
2. Mikä oli alkuperäinen idea sovelluksen takana? Miksi?
3. Onko teillä sovellukseen liitettäviä laitteita/varusteita - millaisia?
4. Keitä ovat ihanteelliset käyttäjänne? Ihanteelliset yrityskumppanit?
5. Onko teidän omilla työntekijöillänne käytössä tämä sovellus?

Pelillistäminen

6. Voisitteko kuvailla tärkeimpiä sovelluksessa käyttämiänne pelillisiä elementtejä?
7. Millaisia keinoja käytätte käyttäjienne motivoimiseen?

Palkkiot

8. Onko teillä jonkinlaisia palkkioita käytössä? Millaisia?
9. Tarjotaanko palkkioita jatkuvasti vai enemmänkin yksitellen?
10. Pohjautuvatko palkkiot kunkin käyttäjän henkilökohtaisiin tavoitteisiin ja saavutuksiin vai yleisiin tasoihin?

Sosiaalinen puoli

11. Onko sovelluksessanne sosiaalista puolta?
12. Millaisia sovelluksen sisäisiä verkostoja tai yhteisöjä on käytössä, joihin käyttäjät voivat liittyä?
13. Mihin muihin verkostoihin sovellus kytkeytyy?

Psykologiset teoriat

14. Olen tehnyt taustatutkimusta kuluttajan psykologiaan ja käyttäytymiseen liittyvistä persoonallisuus- ja motivaatioteorioista. Haluaisin tietää, oletteko ottaneet joitain teorioita huomioon suunnitellessanne sovellusta. (esim. tavoiteteoria, kannustusteoria, itseohjautuvuusteoria)
15. Millaisiin kuluttajan psykologisiin tarpeisiin koetatte erityisesti vedota käyttäjäkokemuksessa? Enemmän henkilökohtaiseen vai sosiaaliseen puoleen?
16. Kuvailisitteko sovellusta enemmän henkilökohtaisena vai sosiaalisena?

Käytön mittaaminen ja tulokset

17. Miten mittaatte käyttöä?
18. Mitkä sovelluksenne ominaisuudet ovat käytetyimpiä/menestyneimpiä?
19. Onko sovelluksella ollut vaikutusta yrityksen tuloksiin? Millä tavoin?

Tulevaisuuden näkymät

20. Millaisia muutoksia sovellukseen on suunnitelmissa tulevaisuudessa?

Appendix 4: Interview Questions for Users (in Finnish)

Perustiedot

1. Yritys, ammatti, ikä
2. Kuinka paljon liikut? Millä tavoin – mitä lajeja?

Historia

3. Kauanko olet käyttänyt tätä liikuntasovellusta?
4. Käytätkö muita vastaavia sovelluksia – mitä?
5. Käytätkö jotakin sovellukseen liitettäviä välineitä tai varusteita (jotka auttavat keräämään dataa) - mitä?

Motivaatio

6. Miksi aloit käyttämään sovellusta alun perin?
7. Mihin tarkoitukseen käytät liikuntasovellusta nyt?
8. Mitkä piirteet sovelluksessa motivoivat sinua eniten käyttämään sitä?

Tavoitteiden asettaminen

9. Asetatko itsellesi tavoitteita?
10. Kuinka usein saavutat tavoitteesi?
11. Mikä motivoi sinua saavuttamaan tavoitteesi?
12. Miltä sinusta tuntuu, kun saavutat tavoitteesi?

Kannustus ja palkkiot

13. Käytetäänkö sovelluksessa jonkinlaisia palkkioita?
14. Miltä sinusta tuntuu, kun saat palkkion suorituksesta?
15. Ovatko sovelluksessa käytetyt palkkiot motivoivia?
16. Mitkä palkkiot toimivat erityisen hyvin motivaattoreina?

Psykologiset tarpeet

17. Kuvailisitko sovelluksen käyttökokemusta enemmän henkilökohtaisena vai sosiaalisena?
18. Herättääkö sovellus erityisiä tunteita? Positiivisia vai negatiivisia?
19. Tunnetko olevasi riippuvainen sovelluksesta?

Sosiaalinen puoli

20. Käyttävätkö monet tuntemasi ihmiset sovellusta?
21. Oletko osa sovelluksen sisäistä yhteisöä tai ryhmää? Tunnetko ryhmän jäsenet?
22. Käytätkö sovellusta osittain sosiaalisista syistä?
23. Koetko sosiaaliset ominaisuudet motivoivina?
24. Oletko suositellut sovellusta muille?

Seuraukset ja tulevaisuus

- 25. Oletko ollut tyytyväinen sovellukseen?
- 26. Onko terveytesi parantunut sen käytön myötä?
- 27. Aiotko jatkaa sovelluksen käyttöä?